BULLETIN

OF THE INSTITUTE OF METALS

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INSTITUTE NEWS

President of the Board of Trade at the Annual Dinner

The Annual Dinner of the Institute was held at Grosvenor House on 31 March. The President (Sir RONALD PRAIN, O.B.E.) was in the Chair, and the principal guest was Mr. REGINALD MAUDLING, P.C., M.P., who deputized for the Prime Minister. About 1200 members and guests were present.

The Loyal Toast having been duly honoured, The Right Honourable REGINALD MAUDLING (President of the Board of Trade), proposing the toast of " The Institute of Metals and the Non-Ferrous Metal Industries ", said:

No one can doubt the importance of the non-ferrous metal industries both to the economy of this country and to the economy of the whole British Commonwealth. One has only to think of the great industries of this country that depend upon the non-ferrous metals and also to think of the great part which is played in the economies of the Commonwealth countries by the mining of the non-ferrous metals.

It is fortunate for us, and for you, that we should be facing such a vigorous growth in the consumption of all the non-ferrous metals. I suppose it is not only fortunate. It is the result of the counterplay and the interchange of those people who think of new uses for these metals, thereby creating a greater demand for them, those who think of new ways of producing the metals, thereby meeting the demand, and also, to quote from the Presidential Address, those who are concerned with transmuting mineral resources into ore reserves.

In all these matters Britain has been in the van of progress. Whether it be the scientist who thinks of the first idea or the technician who turns it into something which can be made and used in a factory, or the man so often forgotten, the commercial man, who provides the money without which none of this would happen anyway—in all these various activities this country has been in the van of progress, and must remain so, for if we do not we fail to do so at our peril; and we must, I am sure, in this most important field of industry avoid the temptation that we sometimes have in this country of thinking that we know everything and that the other people really do not know very much about it.

When we look at the basis of Britain's position in the Commonwealth, I feel that there are two main foundations. The first is the English language. I think that we often underestimate its importance to our political and commercial position throughout the world. We have a unique advantage in our language, and we should not forget that. We have a similar advantage in the influence of our system of law and the influence of our constitutional conceptions and practices. Once again, we often, I think, make the arrogant mistake of thinking that what suits us in the way of a constitution ought to suit other people, and that if it does not it is their fault and not ours.

Our second foundation is our economic strength. Upon the growing strength of our economy depends our ability, first of all, to prove that our democratic system can work and, secondly, to help other countries throughout the world who are less prosperous and less fortunate than we are. I believe there is a growing realization in this country that this job of helping other people is not really a matter of the cold war between one political theory and another. It is a basic moral duty of this country which more and more we are trying to fulfil, because a world divided between the have's and have-not's, with a widening gap between them, will be a very sorry world indeed for all of us to live in.

What we can do to help in this development overseas is limited, of course, entirely by the surplus that we can earn in our trade with the rest of the world. We cannot invest and we cannot help unless we have the resources with which to do so. This must mean that we depend first on growing, and constantly growing, exports, and there is a bigger reliance all the time in this country upon the metal-using industries in our export trade. We must have constantly higher-quality exports, more sophisticated and more developed exports, and the responsibility resting on the metal-using industries is increasing all the time.

Secondly, we must provide larger funds for investment if our export trade is to flourish, and investment covers a whole range from the supply of credits on the one hand to the long-term investment in the extraction of minerals on the other.

The other thing that I am afraid that we shall have to do is to keep always some restraint on home demand, because if we are to provide the capital for development overseas we must provide the savings for it. In the present world, where barriers to trade have been largely swept aside, if home demand is too high, then the effect of sending more goods abroad is to create shortages at home, and that in turn sucks in more money and nullifies, in balance of payments terms, the effects of our exports.

You, Mr. President, in your Presidential Address referred to the open-door policy in international trade as being essential to your industry. I believe it is the only possible policy for an island like our own with limited natural resources, but if we want to sell abroad we must also buy from abroad, and that will include buying increasingly the industrial products from other countries which are developing their own industries. We used at one time to say to our American friends that aid without trade is not enough, and now I think

Members and Guests at the Annual Dinner held at Grosvenor House, London, on 31 March.

that our other friends are saying the same thing to us. How true it is. We have been told on the best authority that it is more blessed to give than to receive; but in modern conditions it is no good doing the one without the other. It is no good giving aid to people unless at the same time you are prepared to buy their products, and, of course, this particularly applies to maintaining as far as we can a stable market for the primary products of many of the under-developed countries of the world.

Our prosperity in the world and our position in the world will depend so much upon the growing demand of the metal-using industries. One can say, fortunately, that tremendous new developments are taking place in this field.

Then there are the new uses for metals which you are constantly producing—the high-purity metals and semi-conductors, the uses of aluminium ranging from ships to the kitchen, and the use of things like zirconium in atomic energy. Finally, there are the new metals, such as beryllium, niobium, and titanium.

I have been trying, in proposing this toast, to explain why it would seem to anyone in the Board of Trade that the future of this country's economy, and thereby the future of this country's political influence, depends to a very great extent indeed upon the metal-using industries. We are extremely fortunate that you and your colleagues should hold such a high position in the world in the science and technology of the non-ferrous metals, and it is in the spirit of the tribute which I think we should all pay to the service which your Institute and your industry render to this country that I ask the company to rise and drink the toast of " The Institute of Metals and the Non-Ferrous Metal Industries ", coupled with your name, Mr. President.

The PRESIDENT, responding, said:

This Institute is greatly honoured that the Prime Minister accepted many months ago our invitation to be here tonight as our chief guest. I say " many months ago " purposely for, clearly, it is impossible for a Prime Minister to say too far ahead exactly what he may be called upon to do in the light of world events. Up to a week ago the Prime Minister was all set to be here. Last Thursday the talks at Geneva took a certain turn which necessitated the Prime Minister going to Washington for urgent talks. He explained personally to me the urgency and he felt that he had to be asked to be excused

Sir Ronald and Lady Prain receiving Mr. and Mrs. John Hay Whitney.

Mr. Reginald Maudling and Lady Prain. In the background, M. Chauvel (French Ambassador).

from attending tonight as he could not say how long those talks would take.

He sent a telegram which reads as follows:

> I very much regret that for the reasons which have been explained to you I am unable to be present at the dinner on March 31. I had been looking forward very much to it. Please convey my greetings and regrets to everybody at the dinner.
>
> HAROLD MACMILLAN

I telegraphed him that the members of this Institute would fully understand his difficulty and would wish him every success on his important mission.

On behalf of everyone present tonight I should like to say how much we appreciate your coming here at short notice, Mr. Maudling. We all welcome Mr. and Mrs. Maudling.

The President of the Board of Trade is perhaps the Minister most concerned with the affairs of the non-ferrous metal industries. I should like to thank you, Sir, for the way in which you have proposed this double toast of " The Institute of Metals and the Non-Ferrous Metal Industries " to which I have to reply for a few moments.

The Prime Minister's visit to Washington is an event of historical importance. So indeed was his recent visit to Africa. The wind of change to which he drew attention in his speech at Cape Town is blowing no less strongly since his visit. I feel sure that history will show that he rendered on that occasion quite as great a service to the Europeans who live in Africa as to the Africans themselves. He drew attention in different words to " the revolution of rising expectations ", a phrase originally coined, I believe, by Governor Adlai Stevenson, which is nowhere more true at the present time than in Africa. These expectations are advancement not only in the economic field but also in the political field, and the Prime Minister drew attention to the fact that, while man cannot live without bread, he is no longer willing to live by bread alone.

I mention this not to trespass on political grounds tonight but because we of the non-ferrous metal industries of Europe have a vital interest in what happens on the African continent, which has become a storehouse for so much of our raw material. But, equally, these African territories have a vital interest in what happens in Europe and America, because it is obvious that fluctuations in the prosperity of the non-ferrous metal industries of the developing countries, principally in America and Europe, will cause great social and economic distress and great problems in these under-developed territories.

On his trip the Prime Minister visited certain countries which are of great interest to this Institute. In Ghana he had an opportunity for seeing the production of the raw materials for aluminium and manganese; in Nigeria of tin; in Rhodesia of copper, chrome, asbestos, and lithium; in the Union of South Africa of manganese, chrome, copper, lead and zinc, uranium, and gold.

Some of these territories are under-developed countries. Others are mono-economies relying principally on one of these metals for their main economic support.

It follows that we in the metal industries of Europe and America have a complete responsibility which extends beyond the normal responsibilities of commerce, because on our actions and on the manner in which we conduct our industries will depend not only the economic stability of these emergent countries but possibly the influences affecting their political future.

You, Mr. Maudling, are familiar, more than most, with the countries and industries of Europe. May I say here how much we have admired your work in connection with the trade problems of Europe in recent years. It is obvious that you like to inform yourself at first hand in these matters. This thirst for knowledge is reminiscent of the schoolmaster who wrote in a report on one of his pupils " If ignorance is bliss, this boy should be assured of a very happy life." I am afraid that on this analogy, Mr. Maudling, you are in for a most unhappy time!

It is fortunate that in recent years the resurgence of Europe has been such that the increase in the consumption of metals has been greater here than in any other part of the world since the last war. The increase in the use of seven leading non-ferrous metals in Europe between 1948 and 1958 was 84%, and it is confidently expected that there will be a similar increase in the next ten years. If this estimate is, in fact, borne out, it is good news for those countries in far parts of the world which produce the raw materials, and it should strengthen their economic position, strategic importance, and political stability.

No other industry outside the non-ferrous metals industries has perhaps quite such a responsibility, even if it does not realize it, in its capacity to affect vast areas of the continents outside Europe and America. The non-ferrous metal industries are thus in a way unique among the industries of the older parts of the world.

As I said before, Mr. Maudling proposed a double toast, " The Institute of Metals and the Non-Ferrous Metal Industries ". This Institute is, of course, one of the learned societies of this country, but not only of this country, because we like to think that it covers a world-wide membership.

I believe, in fact, that of all the learned societies situated in this country the Institute of Metals has the greatest proportion of overseas members. We have just over 5000 members, spread over 65 countries, just over 3000 living in this country and the rest abroad. But I do not propose to take up your time by quoting statistics; I will confine myself to mentioning only two matters concerning this Institute.

The first concerns the Secretary, Colonel Guillan. It may interest you to know that next year he will complete 50 years of service to this Institute. It was he who was largely responsible for organizing this dinner, and I am sure that I am expressing the wishes of our members, and perhaps our guests, if I take this opportunity to congratulate him upon his election this month as an Honorary Member of the Société Française de Métallurgie.

The only other point that I wish to make is that we believe that this Institute performs many useful functions but, in the words of a recent Council report, it may be that none of these will ultimately prove to have been of greater industrial value than its dissemination of experience and knowledge throughout the world.

Our objects could be summed up in the words of Georgius Agricola, the medieval metallurgist and philosopher, who said " But as for us, though we may not have perfected the whole art of the discovery and preparation of metals, at least we can be of great assistance to persons studious in its acquisition."

I now turn to the second part of this toast—the non-ferrous metal industries. I have been at some loss to know how to respond to this. Do we mean the industries of this country, or of Europe, or of the world? Do we mean merely that industry which fabricates the non-ferrous metals to the uses to which we put them, or do we mean the whole of the industries, including the mining of the raw materials? I prefer to treat it in the latter sense and on a world-wide basis, and for this reason I have already referred to the interdependence of the fabricating industries with those areas of the world which produce the raw materials.

I wish for a moment only to refer to the state of these industries today. Again perhaps I may be allowed to quote from Agricola. Agricola was born in Saxony between 400 and 500 years ago. He was a very remarkable medieval scientist and mining engineer, a metallurgist, a chemist, an agriculturist, and a philosopher. He wrote one of the first books about metals which have been recorded, and in this book he said, among other things, that many persons held the opinion that the metal industries were fortuitous and that it was, as an occupation, one of sordid toil and altogether a kind of business not so much of skill as of labour. He also said: " It has been asked whether to work in metals is honourable employment for respectable people or whether it is not degrading and dishonourable." After much philosophizing he eventually concluded that it was both a skilled profession and an honourable calling; and I would venture to share that view. If it were not true, I do not think that we should have the President of the Board of Trade with us tonight. In fact, I believe that the non-ferrous metal industries represent today one of the highest skills in a skilful world.

Agricola also devoted much time to describing the importance of the non-ferrous metals for purposes of war. He traced the course of history and showed that superior knowledge of metals and better control over their supplies were at all times major factors in determining the course of history. Here is the one point where perhaps we do not altogether agree with Agricola, for we believe that the non-ferrous metal industry has a greater interest in the arts of peace than in the arts of war. Its future is irrevocably tied up with the advance of economic standards the world over, and the energies of the members of this Institute are devoted almost exclusively to furthering the advancement of these arts and the completion of these economic purposes.

Mr. Maudling, in thanking you once more for being here tonight and proposing this toast, may I say, in the Prime Minister's own words, that peace is the only victory that mankind can dare to win, and in this objective, for which your Government and your Prime Minister are working so hard, you will find the complete concurrence and co-operation of the non-ferrous metal industries of the free world.

The American Ambassador (His Excellency JOHN HAY WHITNEY) replied to the toast of " The Guests ", proposed by Major C. J. P. BALL, D.S.O., M.C. (Past-President).

2000th Paper

The present issue of the *Journal* contains the 2000th paper published by the Institute. By a happy coincidence this paper is the Presidential Address of Sir Ronald Prain.

The 1000th paper appeared in the August 1945 issue.

"Metallurgical Reviews," Vol. 4, No. 16

Metallurgical Reviews, Vol. 4, No. 16, recently published, contains the following reviews: " The Rolling of Rods, Bars, and Light Sections ", by R. Stewartson; " The Pickling of Non-Ferrous Metals ", by H. Silman; and " The Preparation and Properties of High-Purity Chromium ", by A. R. Edwards, J. I. Nish, and H. L. Wain.

This quarterly publication is available only by annual subscription, the rates being: members 32*s.* 6*d.* ($5.00), post free, and non-members 50*s.* ($7.50), post free.

Election of Members

The following 20 Ordinary Members, 3 Junior Members, and 23 Student Members were elected on 29 March 1960:

As Ordinary Members

ANDERSON, James Somerville, M.Sc., Chief Metallurgist, General Motors-Holden's, Ltd., Melbourne, Vic., Australia.

CAVANAGH, Raymond Leigh, B.A.Sc., Metallurgist, Ontario Research Foundation, Toronto, Ont., Canada.

DARBY, Graham, L.I.M., Assistant Research Officer, Joseph Lucas, Ltd., Group Research Centre, Birmingham.

FEGREDO, Desmond Malcolm, B.Sc., Ph.D., Assistant Research Engineer, Institute of Engineering Research, University of California, Berkeley, Calif., U.S.A.

FIELD, Bernard Duncan, B.Sc., Deputy Metallurgist, The Harlow Metal Co., Ltd., Harlow, Essex.

FISHER, Henry J., M.Sc., D.Eng., Manager, Alloy Department, Beryllium Corp., Reading, Pa., U.S.A.

GADSBY, Donald M., B.E., Metallurgist in Charge of Process and Product Development, Universal-Cyclops Steel Corp., Titusville, Pa., U.S.A.

GRAY, Allen G., M.S., Ph.D., Editor, *Metal Progress*, American Society for Metals, Novelty, Ohio, U.S.A.

KALISKI, Charles Edward, A.M.C.T., A.R.I.C., Hertfordshire Bronze Powder Works, Ltd., Hitchin, Herts.

L'APPELL, Peter Thomas, B.Sc.(Met.), A.R.S.M., Assistant Manager, General Engineering Department, Northern Aluminium Co., Ltd., Rogerstone, Newport, Mon.

LELONG, Pierre Paul Lucien, Ing., L.ès Sc., Chef de Service de Recherches de Base, Tréfileries et Laminoirs du Havre, Centre de Recherches d'Antony, Antony (Seine), France.

MCMAHON, John F., Dean of the College of Ceramics, Alfred University, Alfred, N.Y., U.S.A.

ORR, Robert William, B.S., A.M., Director of Libraries, Iowa State University of Science and Technology, Ames, Iowa, U.S.A.

RICHMOND, James Andrew, B.Sc., A.M.I.Mech.E., Works Manager, The British Aluminium Co., Ltd., Falkirk.

SCOTT, Douglas, A.I.M., Principal Scientific Officer, National Engineering Laboratory, Lubrication and Wear Division, Thornton Hall, Glasgow.

SMITH, Thomas James Jackson, B.Sc., A.R.T.C., A.I.M., Senior Lecturer in Metallurgy, Sheffield College of Technology, Sheffield.

SOLLARS, Albert Roy, B.Sc., Lecturer in Metallurgy, Department of Aircraft Materials, College of Aeronautics, Cranfield, Bucks.

URRY, John Marshall, F.C.A., Managing Director and Chairman, C. M. Powell Bros., Ltd., Birmingham.

VITOVEC, Franz, Dr.tech.sci., Dipl.-Ing., Associate Professor of Metallurgical Engineering, Department of Mining and Metallurgy, University of Wisconsin, Madison, Wis., U.S.A.

WITTE, *Professor* Helmut, Dr.phil., Professor und Inhaber des Lehrstuhls für Physikalische Chemie, Eduard-Zintl-Institut, Technische Hochschule, Darmstadt, Germany.

As Junior Members

LLEWELLYN, William Robert, L.I.M., Metallurgist, Steel Company of Wales, Ltd., Margam, South Wales.

MAANO, Katsuyuki, B.A., Metallurgist, Foundry Services (Japan) Co., Ltd., Osaka, Japan.

PUGH, Edison Neville, B.Sc., Ph.D., Scientific Officer, Grade I, Department of Supply, Defence Standards Laboratories, Alexandria, N.S.W., Australia.

As Student Members

BANKS, David Arthur, Assistant Production Controller (Ore Preparation Plant), Stewarts and Lloyds, Ltd., Corby, Northants.

FRIEBEL, Virgil R., B.S., Graduate Student, School of Mines and Metallurgy, University of Missouri, Rolla, Mo., U.S.A.

HAMER, Robert C., Student, School House, Sedbergh, Yorks.

HAMMON, Martin L., M.S., Los Altos, Calif., U.S.A.

HUNG-CHI CHAO, Graduate Student, School of Mines and Metallurgy, University of Missouri, Rolla, Mo., U.S.A.

JAIN, Satya Prakash, B.Sc., Assistant Professor of Metallurgical Engineering, Bihar Institute of Technology, Sindri Institute, Dhanbad (Bihar), India.

KOELLING, Harold A., B.S., Graduate Student, School of Mines and Metallurgy, University of Missouri, Rolla, Mo., U.S.A.

LEE, John Edward, L.I.M., Assistant to Works Metallurgist, Garringtons, Ltd., Bromsgrove, Worcs.

MALHOTRA, Sham Lal, B.Sc. Met., Lecturer in Metallurgy, College of Mining and Metallurgy, Banaras Hindu University, Banaras, India.

MARCHANT, Peter Reginald, L.I.M., Assistant Metallurgist, Johnson, Matthey and Co., Ltd., London.

MARCHBANKS, Martin Franklin, B.S.Met.E., Graduate Student, School of Mines and Metallurgy, University of Missouri, Rolla, Mo., U.S.A.

MATHIS, Donald Lee, B.S., Graduate Student, School of Mines and Metallurgy, University of Missouri, Rolla, Mo., U.S.A.

PANTON, Robert Francis, L.I.M., Assistant Metallurgist, David Brown Industries, Ltd., Foundries Division, Penistone, Yorks.

PASCOE, Graham, Technical Learner, Metallurgical Laboratory, British Insulated Callender's Cables Research Organization, London.

PEMBERTON, Frederick James, Undergraduate, Department of Physical Metallurgy, University of Birmingham.

ROBERTS, David Ian, L.I.M., Laboratory Assistant, British Non-Ferrous Metals Research Association, London.

ROGERS, John Alan, Undergraduate, Department of Industrial Metallurgy, University of Birmingham.

SWAIN, Peter, Assistant Metallurgist, Central Electricity Generating Board, East Midlands Division, Divisional Laboratory, Nottingham.

WATTS, George Anthony, L.I.M., Technical Assistant, Hawker-Siddeley Nuclear Power Co., Ltd., Langley, Bucks.

WILCOX, Roy Carl, M.S., Graduate Student, School of Mines and Metallurgy, University of Missouri, Rolla, Mo., U.S.A.

WILSHIRE, Brian, B.Sc., Research Student, Department of Metallurgy, University College, Swansea.

WRIGHT, Robert Leon, B.S., Graduate Student, School of Mines and Metallurgy, University of Missouri, Rolla, Mo., U.S.A.

WYKES, Francis Charles, Undergraduate, Department of Metallurgy, University of Cambridge.

PERSONAL NOTES

MR. L. BADONE has left the Department of Mines and Technical Surveys, Ottawa, and is now staff metallurgist at the Etobicoke Works of the Aluminum Company of Canada, Ltd.

MR. I. A. BAILEY has been appointed Deputy Chairman of The Mond Nickel Co., Ltd., and Henry Wiggin and Co., Ltd.

DR. R. L. P. BERRY has been appointed to the Board of Imperial Chemical Industries, Ltd., Metals Division, and to the Delegate Boards of two subsidiaries: Marston Excelsior, Ltd., and Lightning Fasteners, Ltd. Since 1958, Dr. Berry has been Beryllium Project Manager in charge of the construction and commissioning of the I.C.I. Beryllium Plant.

DR. R. D. CARTER has left British Insulated Callender's Cables, Ltd., Prescot, to take up an appointment as Works Metallurgist, with Metal Manufactures, Ltd., Port Kembla, N.S.W., Australia.

MR. WALTER CRAFTS, Associate Director, Technology, Metals Research Laboratories, Union Carbide Metals Co., has been elected President of the American Society for Metals for 1959–60.

DR. A. G. CROCKER has left Sheffield University, where he was awarded the Ph.D. degree, and is now a lecturer in the Department of Physics at Battersea College of Advanced Technology.

MR. A. V. EVERSHED has been appointed a lecturer at Croydon Technical College.

Mr. S. Foldes has been transferred from the Erie, Pa., works of the General Electric Company to the Alloy Studies Group, Flight Propulsion Laboratory Department of the Company at Cincinnati, O.

Mr. A. R. French has left J. Stone and Co. (Charlton), Ltd., to become General Works Manager and Metallurgist of A. Cohen and Co., Ltd. He succeeds Mr. A. E. Cohen, who is retiring at the end of July.

Mr. C. R. Funk has left Alco Products, Inc., Latrobe, to become Chief Metallurgist, Eastern Division, Colorado Fuel and Iron Corp., with headquarters at Claymont, Del.

Dr. R. W. Guard has been transferred from the Research Laboratory of the General Electric Company to the Diamond Products Section, Metallurgical Products Department of the Company at Detroit, Mich.

Dr. H. K. Hardy is now Deputy Director of the Research and Development Branch, Development and Engineering Group, U.K. Atomic Energy Authority. Dr. Hardy is still at Risley, where he was previously Chief Metallurgist.

Dr. J. H. Hollomon has been appointed General Manager of the General Engineering Laboratory of the General Electric Company. His address is 1 River Road, Schenectady 5, N.Y.

Dr. S. L. Hoyt has been appointed staff representative in Europe of the U.S. Department of Defence's Research and Engineering Department, with headquarters at Frankfurt-am-Main. His mission is to advise and consult with responsible men in N.A.T.O. countries on current metallurgical problems.

Dr. J. C. Hudson, Head of the Corrosion Section of the British Iron and Steel Research Association, has been awarded the Sir Robert Hadfield Medal for 1960 by the Iron and Steel Institute.

Mr. F. A. Lytton has been appointed Export Manager of Jessop-Saville, Ltd., and Jessop-Saville (Small Tools), Ltd.

Mr. H. Mole has been appointed a director of D. F. Tayler and Co., Ltd., Birmingham.

Professor Rupert Myers, Head of the School of Metallurgy in the University of New South Wales, has been elected President of the Australian Institute of Metals (Sydney Branch) and Vice-President of the Australian Institute of Nuclear Science and Engineering.

Dr. J. Nutting, Lecturer in Metallurgy at Cambridge, has been appointed Professor of Metallurgy in the University of Leeds, the appointment to be effective from a date to be arranged.

Mr. W. F. Randall has been appointed Deputy Chairman and Managing Director of Telcon Metals, Ltd., a new company formed to take over all activities of the Metals Division of The Telegraph Construction and Maintenance Co., Ltd.

Dr. N. Ridley has been appointed Lecturer in Metallurgy in the University of Manchester.

Mr. A. C. Roberts has left the Research Laboratories of The General Electric Co., Ltd., and taken up an appointment in the Metallurgy Division of the Atomic Energy Research Establishment, Harwell.

Deaths

The Editor regrets to announce the deaths of:

Dr. Charles Alfred Edwards, F.R.S., on 29 March 1960, aged 77. An Original Member of the Institute, he was Professor of Metallurgy at University College, Swansea, from 1920 to 1947 and Principal of the College from 1927 to 1947.

Mr. Stanley Robson at Birchington, Kent, on 26 March. After serving for a number of years as Manager of the Avonmouth works of the National Smelting Company, Mr. Robson became consultant to the Imperial Smelting Corporation, Ltd., and associated companies.

MEDALLISTS FOR 1960

Professor R. F. Mehl

Institute of Metals (Platinum) Medallist

Robert Franklin Mehl was born at Lancaster, Pa., in 1898. He was educated at Franklin and Marshall College, Lancaster, Pa., where he graduated B.S. in 1919, and Princeton University (Ph.D., 1924).

On leaving Princeton, he was successively Head of the Department of Chemistry, Juniata College (1923–25),

National Research Fellow at Harvard University (1925–27), Superintendent of the Division of Physical Metallurgy, Naval Research Laboratory, Washington, D.C. (1927–31), and Assistant Director, Research Laboratories, The American Rolling Mill Company, Middletown, O. (1931–32). In 1932 he was appointed Director of the Metals Research Laboratory and Professor of Metallurgy at the Carnegie Institute of Technology, Pittsburgh, Pa., and from 1935 to 1959 served also as Head of the Department of Metallurgical Engineering. In addition, he was from 1953 until recently Dean of Graduate Studies.

Since early this year, Professor Mehl has been on leave of absence from the Carnegie Institute of Technology in order to serve as Consultant to the United States Steel Corporation on basic science and research. His headquarters are at Zürich.

Professor Mehl has published more than 150 papers on a wide range of metallurgical subjects, and he is the editor of the Metallurgy and Metallurgical Engineering Series of text-books published by the McGraw-Hill Book Co., Inc. He translated Professor Tammann's book "The States of Aggregation" ("Aggregatzustände") (D. Van Nostrand Company, 1925)

and is the author of "Metallurgy of Iron and Steel" (published in Portuguese in São Paulo, Brazil, in 1944) and of "Brief History of the Science of Metals" (American Institute of Mining and Metallurgical Engineers, 1947).

Professor Mehl is a member of numerous technical and scientific societies and a member of many committees. He has been Chairman of the Metallurgical Education Advisory Committee of the American Society for Metals; the Metallurgical Engineering Education Committee of the American Society for Engineering Education; and the Metallurgy Panel, Research and Development Board, Department of Defence, Washington, D.C. He inaugurated, and was first Chairman of, the Materials Advisory Board of the National Academy of Sciences (1950). He was made a member of the National Academy of Sciences in 1958.

Among the honours he has received are the prize certificate for the best scientific paper published in the *Transactions* of the Institute of Metals Division of the American Institute of Mining and Metallurgical Engineers (1934, 1939, 1943, 1944, 1947); the John Scott Medal, certificate, and prize award for the development of gamma-ray radiography (1934); the Howe Medal of the American Society for Metals (1939); the Medal of the American Industrial Radium and X-Ray Society (1943); the Medal of the Associação Brasileira de Metais (1944); the James Douglas Gold Medal of the American Institute of Mining and Metallurgical Engineers (1945); Gold Medal of the American Society for Metals (1952); Clamer Medal of the Franklin Institute (1953); Le Chatelier Medal of the Société Française de Métallurgie (1956); Pittsburgh Award of the American Chemical Society (1956); and Vincent Bendix Award of the American Society for Engineering Education (1959).

He has delivered numerous special lectures to scientific societies, including the Annual Institute of Metals Lecture of the American Institute of Mining and Metallurgical Engineers (1936); Twelfth Annual Priestley Lectures (five) at the Pennsylvania State College (1938); Campbell Lecture of the American Society for Metals (1941); Sauveur Lecture of the American Society for Metals (1940 and 1943); Special Lectures at the Universidade de São Paulo, Brazil (1943 and 1949); the Hatfield Memorial Lecture of the Iron and Steel Institute (1948); the Carnegie Memorial Lecture of the American Society for Metals (1955); Le Chatelier Lecture of the Société Française de Métallurgie (1956), and, early this year, the Howe Memorial Lecture of the American Institute of Mining, Metallurgical, and Petroleum Engineers.

Professor Mehl has been the recipient of honorary doctorates from Franklin and Marshall College (1938), the Universidade de São Paulo, Brazil (1944), Stevens Institute of Technology (1944), Colorado School of Mines (1952), Case Institute of Technology (1959), and University of Pennsylvania (1959).

Professor N. J. Petch

(Rosenhain Medallist)

Norman James Petch was born at Bearsden, Dunbartonshire, in 1917. He was educated at the University of London, where he graduated in chemistry in 1936 and subsequently took part of the engineering degree course, and at the University of Sheffield, where he graduated in metallurgy in 1939.

For the next three years he carried out X-ray crystallographic work in the Cavendish Laboratory, Cambridge. From 1942 to 1946 he was with the Metallurgy Division of the Royal Aircraft Establishment, Farnborough, as Head of the X-Ray Section. He then returned to the Cavendish Laboratory, where he joined the Metal Physics Group under Dr. E. Orowan and began to work on fracture problems. Leaving Cambridge in 1948, he went to Sheffield on behalf of the British Iron and Steel Research Association, and reported on problems in the cutlery industry. In 1949 he was appointed Reader in Metallurgy at the University of Leeds, and in 1956 became first Professor of Metallurgy there. Last year he was appointed William Cochrane Professor of Metallurgy at King's College, University of Durham, Newcastle-upon-Tyne.

His research work was initially concerned with atomic structures, in particular with the positions of the carbon atoms in cementite, austenite, and martensite, but for some years now his interests have been principally in dislocation theories of the yield, flow, and fracture of α-iron.

LOCAL SECTION NEWS

Birmingham Local Section Golden Jubilee

The year 1960 brings the Golden Jubilee of the Birmingham Local Section. This was the first of the Local Sections of the Institute to be formed, being founded two years after the inauguration of the Institute itself. The occasion was celebrated at the Annual General Meeting of the Local Section on 17 March, when the Section was honoured by a visit from the President and Secretary of the Institute. After the formal business, the retiring Chairman, Dr. C. E. Homer, gave his Chairman's Address, dealing with the history, achievements, and prospects of the Local Section. At the end of the meeting, there was a dinner party at which officers and members of the Section entertained the President and Secretary.

The possibility of forming a Local Section in Birmingham was first discussed formally at a preliminary meeting held at the Grand Hotel, Birmingham, on 16 June 1910. Considerable interest was expressed, and 26 members of the Institute completed application forms. A further meeting of members was held on 4 July, when rules were drafted, officers and a committee elected, and a petition sent to the Institute asking the Council to approve the formation of the Local Section. Approval was given, and the Section was established with the following Committee:

Chairman:	G. A. Boeddicker.
Hon. Secretaries:	R. M. Sheppard and G. G. Poppleton.
Hon. Treasurer:	F. Johnson.
Committee:	T. Vaughan Hughes
	O. F. Hudson
	E. W. Dobbs
	J. W. Earle
	A. Spittle
	B. J. Mason
	Prof. T. Turner.

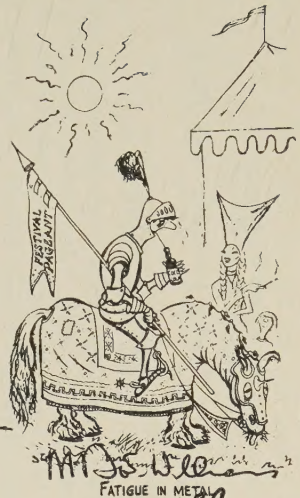
No grant was sought from the parent Institute, a subscription of 5*s.* 0*d.* per annum being charged to make the Section self-supporting. Later, in 1911, the election of Associate Members, i.e. people who were not members of the Institute, was approved by the Council, and for many years the Associates formed an important part of the membership of the Local Section. At first they were charged a subscription of 10*s.* 0*d.*, which was later reduced to 5*s.* 0*d.*, as for ordinary members. It was not until the end of the 1914–18 War that the Institute provided grants to Local Sections, and additional local subscriptions were no longer required from members.

WINES

Hochheimer
Reisling

Volnay Grand Vin

Liqueurs



DINNER

Pate Maison

Filet de Sole Walewska

Tournedos Castillane
Pomme fondante
Haricot vert au beurre

Bavarois a l'ananas

Cafe

THE GRAND HOTEL

BIRMINGHAM

17th March, 1960

TOASTS

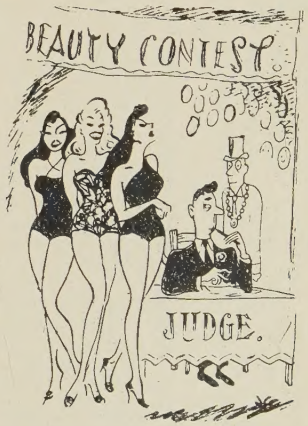
The Queen

The Birmingham Local Section

Mr. G. L. Bailey

Reply

Dr. C. E. Homer



Menu of the Golden Jubilee Dinner of the Birmingham Local Section. In addition to those whose signatures appear on the menu, Sir Horace Clarke was also present.

An interesting and pleasant feature of these early days was a supper preceding all ordinary general meetings, a practice that continued until 1919. Another interesting feature was the election of a number of casters, moulders, wire-drawers, foremen, &c., as Associate Members, suggesting that the gap between craft and science was less marked than it is to-day.

The first two lectures to the Section were by Mr. O. F. Hudson, of the University of Birmingham, on the subject "An Introduction to Metallography". Thus began a long period during which the University made a major contribution to the success of the Local Section. Professor Turner played a very active part in its affairs from its inception until he retired in 1926, and no less than five of the Honorary Secretaries of the Section were members of the staff of the Metallurgical Department of the University. At first the Municipal Technical School (now the College of Advanced Technology) was less intimately connected with the activities of the Section; it had itself inaugurated a Metallurgical Society in 1903, which later became the Birmingham Metallurgical Society. During the long period when Dr. F. Johnson was Head of the Metallurgical Department of the College, relations with the College became very close, and he himself was a most active member. Close relations have continued to the present day, and the new College is now the regular meeting place for the Local Section.

Perusal of the records shows that many men who later played a prominent part in the affairs of the Institute, as Presidents or Members of Council, gained early experience of Institute affairs as officers of the Birmingham Local Section.

Most Local Sections have had to tackle the problem of relations with other metallurgical societies established in their district. In the Birmingham area both the Staffordshire Iron and Steel Institute and the Birmingham Metallurgical Society were already in being when the Local Section was formed. The three bodies continued independently for a number of years, with occasional joint meetings and a number of common members. In the middle twenties, the feeling developed that some form of co-operation would be preferable, and for the Session 1926–27 a Co-ordinating Committee was set up to plan and carry through a joint programme of meetings for the three societies. The experiment was considered to be a success, and the scheme has continued ever since, except that the Staffordshire Iron and Steel Institute withdrew in 1950, having decided no longer to hold their meetings in Birmingham. In its earlier years the Section had an annual dinner (the tickets in 1914 were 3*s.* 6*d.*!), as well as the supper before ordinary meetings, but since the co-ordination scheme was established it has not generally held social functions of its own, these being run for a time by the societies jointly, and more recently by the Birmingham Metallurgical Society alone.

The Birmingham Local Section has been responsible in recent years for two important innovations in Local Section activities. The first was the organization of an all-day symposium which was open to all interested and for which a fee was charged to make it self-supporting. A symposium of this type was held in each of the five years 1949–53, and all were successful, though the last attracted a smaller attendance than the others. In 1954 the Section inaugurated an annual Christmas Lecture on some aspect of metallurgy for sixth-form boys and girls from local Grammar schools. The first was given by Dr. J. W. Jenkin to some 250 children, and the popularity of this function has increased each year, the attendance in 1959 being around 600.

From this summary of the activities of the Birmingham Local Section it may be concluded that it is a lively, vigorous organization. But, although the Section offers a series of lectures on a wide diversity of subjects, the attendance at meetings is not as high as might be expected from a membership of about 700. The Committee is trying to encourage younger members to take a more active part and to widen their outlook by attending lectures on subjects outside their immediate field of work. By their interest alone can the Birmingham Local Section continue to cement and adorn the structure which has been raised on the foundations so firmly laid fifty years ago.

London Local Section Dinner

The third annual informal dinner of the London Local Section was held on 17 March at the Horse Shoe Hotel, Tottenham Court Road, W.1. Afterwards there was an interesting address by Mr. L. C. Nickolls, Director of the Metropolitan Police Laboratory, who spoke about some aspects of his work. Mr. R. G. Harper, Chairman of the Section, presided.

LECTURES TO LOCAL SECTIONS

Metals in Antiquity

Speaking to the South Wales Local Section on 12 January about "Metals in Antiquity", Mr. L. Biek (Ancient Monuments Laboratory, Ministry of Works) asserted that all the knowledge on metals was in the audience. He therefore proposed to reverse the normal procedure, in describing some work with which he had been connected, by outlining some of the metallurgical puzzles involved, and inviting answers rather than questions at the end.

The unity of the study as a whole was apparent if considered against the background of the familiar cycle: ore—(extraction)—metal—(fabrication)—artefact—(use; burial or atmospheric exposure)—corrosion product. Often there was clearly a strong family resemblance between the first and the last. Unlike modern processes, those of antiquity were not accessible to direct study; one had only the *products*, and in some cases circumstantial evidence of equipment and conditions. Yet it was the *processes* (shown in brackets above) that were perhaps even more diagnostic of the level and development of technical skills, of the geographical factors involved, and of the "micro-environment" prevailing at a given time.

Examples were given of attempts to elucidate the processes, with the help of specialists at research institutions, universities, museums, and commercial concerns. Knowledge had to remain inferential, but some possibilities could usefully be eliminated. Nearly all this evidence was datable to the beginning of periods some fifty to a hundred times as long as the maximum normally covered by modern exposure testing. The results of scientific work on such material could therefore often be of benefit to archæologist and metallurgist alike.

Spectrographic analysis (Morgan Crucible Company) of some likely copper "ore" samples was helping in the search for a regional "impurities pattern" of trace elements. Together with similar work on the finished axes of the Early Bronze Age, it would in time give an indication of possible sources and smelting techniques, such as had been obtained recently in Austria. The value of a large series of chemical analyses (Steel Company of Wales) and the significance of

fayalite (B.I.S.R.A.) in the interpretation of Roman and Medieval iron smelting slags had been demonstrated.

Supported by X-radiographic (Ancient Monuments Laboratory) and metallographic work (National Physical Laboratory), research by J. W. Anstee (Museum of English Rural Life, University of Reading) had recently culminated in the production of a pattern-welded sword of " Saxon " type. It was possible to reproduce in a primitive forge a variety of characteristics found in such swords by twist-welding and grinding piled strips of clean wrought iron.

The microstructures revealed (Tin Research Institute) in some Bronze Age bronze awls suggested that cold work and annealing had been the last metallurgically significant operations before burial, rather than possible incipient fusion in the funeral pyre among whose remains the objects had been found.

Close contact was maintained with the National Chemical Laboratory over Roman and Medieval deposits found waterlogged and containing well-preserved iron and other metal objects. It seemed that the activity of sulphate-reducing bacteria was here often restricted in the presence of organic material of polyphenolic nature. Somewhat irrelevantly, but quite directly, this work had led (through tests at Forestal Central Laboratories and Paint Research Station) to the use of a tannin primer, as part of a comprehensive protective system, in the refurbishing of the century-old cast-iron tiles roofing " Big Ben ".

In the lively discussion which followed, many interesting, valuable, and ingenious suggestions were made. In proposing a vote of thanks, Professor A. R. E. Singer stressed that, despite modern refinement in analytical techniques, many fascinating details of ancient processes remained elusive.

Roman and Medieval metal objects were on view after the lecture, with X-radiographs to illustrate details of craftsmanship and differential corrosion.

Some Metallurgical Factors Associated with the Failure of Engineering Structures

On 2 February, Dr. L. E. Benson (Associated Electrical Industries (Manchester) Ltd.) spoke to the Oxford Local Section on " Some Metallurgical Factors Associated with the Failure of Engineering Structures."

The main features of the anatomy of a cast steel ingot were first mentioned, and it was shown how inherent weaknesses of various kinds might bring about failure of either forgings or castings in service. Microstructural effects were also mentioned, and some limitations on the use of austenitic steels on this account were indicated.

To illustrate how service conditions might be important, several examples of failures of the stress-corrosion type were mentioned. These related both to steel and non-ferrous alloys, and it was pointed out that the " season-cracking " test employing mercurous nitrate did not ensure complete freedom from residual stress.

It was also pointed out that with many engineering structures service conditions were becoming increasingly arduous to such a degree that standards of quality had, of necessity, become more rigorous. The modern high-pressure feed-water heater for land power-station use, for instance, had necessitated the development of eddy-current testing techniques to ensure the requisite uniformity of quality.

The lecturer dealt with the significance of internal-stress effects, the importance of which was not always realized. He showed, for example, how improper heat-treatment conditions could reduce the fatigue strength of alloy-steel gears and weaken other components by causing internal ruptures. It was also shown that this type of weakness was important with non-ferrous alloys as well as steel.

Finally, the lecturer dealt with the importance of residual stresses in explaining the catastrophic failure of welded structures, such as oil storage tanks, ships, and bridges.

Metals and High-Speed Flight

At its meeting on 18 February, the Birmingham Local Section heard a lecture by Professor A. J. Kennedy (College of Aeronautics, Cranfield) on " Metals and High-Speed Flight."

He said that, while aeronautics had always been a major stimulus to the development and utilization of materials, the demands that were now arising in the design of very high-speed aircraft and space vehicles represented a quite new class of difficulty. The very high temperatures encountered in re-entry and in certain propulsion units extended the design requirements over a range of properties, thermal, mechanical, and chemical. None of these could be successfully studied without due regard being paid to the structural requirements of the machine as a whole.

At very high temperatures, no material had better potentialities for thermal resistance than graphite (which should now be boldly appropriated by metallurgists as part of their legitimate province). This material combined a very high sublimation temperature and energy with a usefully low density. Its rivals at extreme temperatures (the ceramic oxides, tungsten, and rhenium) had various limitations, either of brittleness, fabricability, or scarcity, but the overriding consideration was generally that of reactivity, particularly oxidation. This was true of graphite as well as the other lower-temperature materials, such as nickel and cobalt, and was a major factor over the whole temperature range above about 900–1000° C. Molybdenum, with its useful density and modulus, oxidized catastrophically; chromium was distinctly better at the lower temperatures, but had still to be protected at the higher (unfortunately it possessed a prohibitively low room-temperature ductility); niobium had far too low a modulus to be attractive; and all the cermet variations were still too doubtful under conditions of dynamic stressing to be acceptable at the present time. The discovery of a successful high-temperature self-regenerating coating would change the situation very significantly, and there were some prospects of success in this direction.

There were vast areas of metallurgical study yet to be undertaken, of very great variety and importance. In the immediate future, the behaviour of the light alloys (certainly the high-strength aluminium alloys and possibly titanium also) would have to be thoroughly assessed and understood under the conditions imposed by Mach 2 aircraft, that was, at skin temperatures of around 130° C. Beyond this would lie another generation of aircraft constructed of stainless steel. These were immediate objectives. In the longer term, the construction of very advanced machines capable of Mach 15 and the like, and of satellites and space vehicles, would require a most intensive collaboration between designers and metallurgists. It was to be hoped that the challenge of this remarkable technology would attract to it metallurgists of real ability; they were, and would be, very badly needed.

Porosity in Sintered Materials

Professor R. Higgins, of University College, Swansea, gave a lecture on " The Effect of Porosity in Sintered Materials " to the South Wales Local Section on 1 March.

He said that the performance in practice of any sintered material depended on a considerable number of factors, apart from the actual chemical composition of the mix. Of these, porosity and permeability of the fired mass were the most important, as these properties determined to a large degree the rate of gas and slag penetration of the sintered mass, as well as controlling the mechanical strength and thermal conductivity at low temperatures. The porosity of any mix depended initially on the grading of the mix used, and the lecturer recommended an approach, as far as refractories were concerned, to an ideal mixture of coarse : medium : fine of $-16 + 22 : -44 + 60 : -100$, and discussed the influence of wider grading and greater compacting pressure on the porosity and permeability in the green state.

The object of the thermal treatment in sintering was to form a bond, partial or complete, between the mineral components of the mass, and this thermal treatment affected the properties of the mineral particle by desulphurization or decarburization or by ionic interchange. The possible effect of these changes in the porosity of the individual grains was considered, as the minimum porosity obtainable was limited by that of the grain.

The mechanism of bond formation was discussed, and it was suggested that initially the porosity and permeability decreased; later an increase in permeability might result, although the porosity still decreased. The lecturer illustrated the theory by results obtained by adding iron oxide or titania to Dinas quartzite, and considering the effect of temperature and time of firing on the properties of the resulting refractory. He also discussed possible means of lowering the porosity of refractories.

The necessity of correct compacting pressure and formation of the bond in materials used for furnace-hearth construction were also considered, with special reference to the metal tightness of the hearth. Finally, the lecturer dealt at some length with the ideal properties of sinter for use in the iron blast furnace and in the zinc blast furnace, making special reference to the constitution of the bond and to the undesirable losses resulting from excessive solution of the mineral in the bond.

POWDER METALLURGY JOINT GROUP

" Powder Metallurgy " No. 5

The following papers appear in *Powder Metallurgy*, No. 5 (1960), recently published:

The Rolling of Copper Strip from Hydrogen-Reduced and Other Powders

By D. G. Hunt and R. Eborall

(*British Non-Ferrous Metals Research Association, London*)

Copper powders were rolled to form strip in a normal two-high mill. Satisfactory green strip was obtained from the low-density powder produced by hydrogen reduction from aqueous solution, provided that a mechanical method was used to feed the powder into the rolls. All the types of powder investigated required considerable further rolling after compaction, with at least two heat-treatments, to produce normal mechanical properties.

Some Mechanical Requirements of Plant for the Roll-Compacting Process

By A. F. Marshall

(*B.S.A. Group Research Centre, Birmingham*)

The paper is based on a survey of recent literature on the art of roll compacting made for the purpose of producing criteria for use in the design of processing plant. After a definition of the duty required of such plant has been given, the type of mill necessary is discussed, and the various systems used for dispensing powder are considered in relation to the operational requirements. The process of roll compacting and the resulting strip conditions are discussed in relation to the variables in physical dimensions of plant and product. Certain criteria applying to the roll-compacting process are mentioned, and the wide variation in strip speeds employed by various investigators is noted. It is considered that roll loads as given by some investigators may be higher than those actually obtaining in practice, and some explanation of this claim is given. Finally, brief reference is made to the lubrication of the rolls or the powder during the compacting process and to subsequent processes including sintering, densification, and cold rolling.

Continuous Compaction by Cyclic Pressing

By C. Deibel, D. R. Thornburg, and F. Emley

(*Westinghouse Electric Corporation, East Pittsburgh, Pa., U.S.A.*)

A process recently developed produces wide, thick bars of unlimited length from powder, granular, or sponge raw materials by a cyclic pressing operation. The process can be adapted readily for laboratory study or for large-scale production.

Many materials have been pressed by this technique, and in all cases compaction was similar to that experienced in conventional pressing. Work on the pressing, sintering, and subsequent working of various nickel powders and of a nickel–iron–molybdenum magnetic alloy has been carried out. Carbonyl nickel powder produces nickel strip of high quality. A high-permeability alloy containing nickel 79, iron 17, and molybdenum 4% can be made into strip with good magnetic properties by compacting the powders with the cyclic-pressing technique and then sintering and rolling the pressed bar into strip.

The Formation of Uranium and of Beryllium Alloys by the Solid-State Sintering of Mixed Elemental Powders

By J. Williams and J. W. S. Jones

(*Metallurgy Division, Atomic Energy Research Establishment, Harwell, Berks*)

Large volume expansions accompany the formation of binary alloys of beryllium with uranium, thorium, iron, copper, zirconium, titanium, and vanadium, and of uranium with aluminium, during the sintering of the mixed, cold-compacted elemental powders. No expansion was detected during the sintering of binary mixtures of beryllium with aluminium, silicon, and magnesium, or mixtures of uranium with zirconium, molybdenum, iron, nickel, manganese, and chromium.

When it occurs, expansion is anisotropic, being greatest in the direction of compacting; the degree of anisotropy varies with the constituents and the composition of the alloys. In systems undergoing expansion, the volume expansion/composition graphs exhibit maxima. For a given system the magnitude of the maximum is a function of the shape of com-

pact, the particle size of the powders, and the sintering time and temperature; the composition at which the maximum occurs is sensibly unaffected by these latter variables.

These experimental observations, together with those of other investigators, can be satisfactorily interpreted on the hypothesis that volume expansion is due to the formation of diffusional porosity during sintering.

Metal–Ceramic Mixtures

By P. Murray

(Metallurgy Division, Atomic Energy Research Establishment, Harwell, Berks)

The present position regarding cermets based on either oxides or carbides as the brittle phase is reviewed. The outlook for oxide systems is to some extent disappointing, since little gain in strength has been found compared with the oxide itself. Oxide cermets do, however, show an intermediate improvement in thermal shock-resistance that is useful in a number of directions. Carbide cermets appear adequate for many high-duty applications so far as thermal shock-resistance is concerned, but improvements in their resistance to mechanical shock are still necessary. Recent work on ductile ceramics is also reviewed, and the importance of carrying out experiments at high strain rates is emphasized. Finally, suggestions are made for further work in the field of cermets.

A Metallographic Technique for Ferrites

By J. E. Hughes and S. Ratcliffe

(Siemens Edison Swan Ltd., Harlow, Essex)

A technique is described for the rapid preparation of ferrite specimens for metallographic examination by means of polytetrafluorethylene polishing laps impregnated with diamond.

Sintered Stainless Steel. I.—The Influence of Alloy Composition upon Compacting and Sintering Behaviour

By R. L. Sands and J. F. Watkinson

(B.S.A. Group Research Centre, Birmingham)

A number of stainless-steel powders have been examined, and their properties determined after various compacting and sintering treatments. The influence of alloy composition has been considered, and various conclusions are drawn.

Sintered Stainless Steel. II.—The Properties of Stainless Steel Powders Sintered in Dissociated Ammonia

By R. L. Sands and J. F. Watkinson

(B.S.A. Group Research Centre, Birmingham)

Powders having compositions selected in accordance with the results of earlier work have been processed under conditions simulating industrial practice. The properties that can be obtained under such conditions are described.

Textures in Beryllium Rods and Tubes Extruded from Consolidated Powder

By N. A. Hill and J. Williams

(Metallurgy Division, Atomic Energy Research Establishment, Harwell, Berks)

The textures in beryllium rods and tubes extruded from consolidated powder have been studied by X-ray diffraction techniques.

The temperature of extrusion has little effect on the texture, but the extrusion reduction determines which of two main types of texture is developed in tubes. In low-reduction textures ($\leqslant 6:1$), the basal planes tend to concentrate parallel to the surface of the tube; in high-reduction textures ($\geqslant 12:1$), the basal planes still lie parallel to the extrusion direction, but tend to concentrate at angles ranging from 45–90° to the surface. A prism-plane fibre texture is present in all tubes.

The deformation mechanisms possibly responsible for these textures are discussed.

The Compacting of Graphite and Graphite/Uranium/Thorium Mixtures

By D. T. Livey, I. Denton, N. Brett, and J. Williams

(Metallurgy Division, Atomic Energy Research Establishment, Harwell, Berks)

Fine artificial graphite powders can be cold compacted to give bodies of high density (~88% of theoretical), low permeability ($B_0 \sim 10^{-14}$cm^2), and reasonable strength. Such powders, after vacuum annealing, will not compact.

Die-compacted powder has strongly anisotropic properties, owing to a high degree of preferred orientation within the compact; this effect is less marked in hydrostatically compacted powder. Minor dimensional changes occur when compacts are annealed in the range 600–1000° C.

The preparation of fuels by incorporation of fissile and fertile materials into graphite powder and cold compacting is described.

The Continuous Sintering of Copper–Lead to Steel

By P. G. Forrester and J. K. Beddow

(The Glacier Metal Co. Ltd., Kilmarnock, Ayrshire)

Bimetal strip consisting of copper–lead bonded to steel is produced by sintering uncompacted powder on to the steel, compacting by rolling, and resintering. The mechanism of the process is considered in the light of published work on liquid-phase sintering and of some experiments in which material at various stages of processing has been examined physically and metallographically. It is concluded that the process differs from normal liquid-phase sintering in that interparticle welding is brought about by the intermediate rolling process.

Discussion on " The Powder Metallurgy of Magnetic Materials "

A report on the discussion at the last meeting of the Powder Metallurgy Joint Group, held in London on 16 December 1959.

Powder Metallurgy, which appears twice a year, is the official organ of the Powder Metallurgy Joint Group. It is obtainable by annual subscription at 25*s.* (post free) to non-members; members of The Iron and Steel Institute and The Institute of Metals may obtain it for an annual fee of 10*s.* post free.

OTHER NEWS

Visit by the Magnesium Association of America

At the invitation of the Magnesium Industry Council, the Spring Meeting of the Magnesium Association of America will be held in Britain towards the end of May, 1960. The

membership of the Association includes the majority of American firms interested in magnesium and its alloys, and there are also associate members in Europe.

The Meeting will open on 23 May with two days' presentation of scientific and technical papers, after which visits will be paid to foundries and works in the Midlands and in the Manchester area, where further papers will be read.

About 60 members of the Association, many of them accompanied by their ladies, are expected to attend, and the meeting will also be attended by representatives of the member firms of the Magnesium Industry Council.

Gordon Research Conference

One of the 1960 Gordon Research Conferences will deal with "Physical Metallurgy—Relation of Structure and Properties." It will take place from 27 June to 1 July 1960 at the Kimball Union Academy, Meriden, N.H., and will be under the chairmanship of R. L. Fullman.

The Gordon Research Conferences were established to stimulate research in universities, research foundations, and industrial laboratories. This purpose is achieved by an informal type of meeting consisting of scheduled lectures and discussion groups.

Additional information may be obtained from W. George Parks, Department of Chemistry, University of Rhode Island, Kingston, R.I., U.S.A.

Graduate Course in Foundry Science and Engineering

The Department of Industrial Metallurgy at Birmingham University is to repeat, during the 1960–61 session, a post-graduate course in foundry science that was given in 1958. The course is of nine months' duration, leading to a Diploma in graduate studies, or of one year's duration, leading to the M.Sc. degree.

The broad aim of the course is to provide advanced University training in the combined fields of foundry science and engineering. The course assumes prior training in metallurgy, science, or engineering up to degree standard.

The inclusive fee for the course is £81. In certain cases where a student is not sponsored by an employer, the University will consider applications for remission of this fee and, where necessary, for the grant of a maintenance allowance.

Forms of application may be obtained from the Registrar, The University, Edgbaston, Birmingham 15; further information about the course can be obtained from the Secretary of the Department of Industrial Metallurgy, at the above address.

Symposium on "The Protection of Gas Plant and Equipment from Corrosion"

A symposium on "The Protection of Gas Plant and Equipment from Corrosion" is to be held in Birmingham on 22 and 23 September 1960. It is sponsored jointly by the Institution of Gas Engineers, the Corrosion Group of the Society of Chemical Industry, and the College of Advanced Technology, Birmingham.

The symposium, divided into four technical sessions, will deal with problems relating to the corrosion and protection of gas production plant, distribution pipelines, and fittings and appliances.

A registration fee of £3 3*s*. 0*d*. will be charged (£2 2*s*. 0*d*. to members of the I.G.E., S.C.I., and bona fide students). Those who register will receive preprints of the papers to be presented.

Further details may be obtained from Mr. A. S. Blower, Department of Chemistry, College of Advanced Technology, Suffolk Street, Birmingham 1.

APPOINTMENTS VACANT

FOUNDRY METALLURGIST to initiate formal control, technical development (alloys), compile standards, and establish central test laboratory in growing almn./engineering business in the London Area. Box No. 455, The Institute of Metals, 17 Belgrave Square, London, S.W.1.

METALLURGIST

An interesting and progressive staff appointment awaits a university graduate in metallurgy. The successful candidate will join an expanding specialist department with a well-known company of non-ferrous metal manufacturers. We do not insist upon industrial experience. The appointment is at one of the group factories in S.W. Lancashire. Full details please to Box No. 453, The Institute of Metals, 17 Belgrave Square, London, S.W.1.

SOLIDIFICATION OF CAST METALS

The Mond Nickel Company, Limited

DEVELOPMENT AND RESEARCH DEPARTMENT LABORATORY, BIRMINGHAM

The Mond Nickel Company, Limited, requires a Research Metallurgist to fill a senior post in the Melting and Casting Section of the above Laboratory. The post carries responsibility for the planning and conduct of investigations aimed at devising methods and alloy compositions suited to the production of sound ingots and engineering castings in high-strength, high-temperature alloys. Applications are invited from men having a good professional qualification, with proved research experience in the melting and casting field.

An attractive salary awaits a suitable applicant. Pension and assurance schemes are in operation and, in appropriate cases, assistance can be given for housing. Applications, which will be treated in confidence, should give details of age, qualifications, and experience. They should be addressed to The General Manager, Development and Research Department, The Mond Nickel Company, Limited, Thames House, Millbank, London, S.W.1. Please mark envelope "Confidential L 82".

POST-GRADUATE COURSE

BATTERSEA COLLEGE OF TECHNOLOGY, LONDON, S.W.11

(A College of Advanced Technology)

Post-graduate courses in CRYSTALLOGRAPHY consisting of one year full-time or two years part-time, will begin on 3rd October 1960. These courses prepare for either the Internal degree of M.Sc. (Crystallography) of the University of London, or the College Post-Graduate Diploma (D.C.T.(Batt.)). Scholarships are available in certain circumstances. For further details apply to the Senior Lecturer-in-charge of the Crystallography Section.